
Urinary Incontinence in the Elderly

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Urinary incontinence is a common and distressing problem for elderly patients, their families and friends, and the health professionals who care for them. It is a heterogeneous condition, and appropriate management depends on a thorough evaluation and understanding of the multiple factors that can play a role in its cause and perpetuation. Identifying reversible causes of transient incontinence, and appropriate management of incontinence that is associated with acute illness, can be important in preventing the problem from becoming established.

A thorough diagnostic evaluation of urinary incontinence in the elderly, and appropriate use of the different types of therapy, will greatly improve the management in these cases. The need and opportunities for research to improve the management of incontinent elderly persons should be considered by all those involved in caring for this population.

. . . a patch of urine cannot be readily explained—its treatment has proved beyond most of us; and as to its significance, it will make the difference between social acceptance and rejection with all that involves in prolonged hospital care and expense.

J. L. NEWMAN
"Old Folks in Wet Beds"
British Medical Journal, 1962

ALTHOUGH THESE FEW PHRASES were written 20 years ago, they aptly summarize the essence of what remains a major problem in the care of the elderly.

Incontinence of urine is a common and frequently incapacitating condition that afflicts nearly 3 million elderly people in this country, and

millions of others throughout the rest of the world. It has substantial impact on a person's well-being, on the ability of family or friends to cope with an old person and on the costs of health care for this population.

Despite the heterogeneous causes of urinary incontinence in the elderly, and the dearth of well-designed research on its management, several basic principles regarding the cause, diagnosis and treatment of this condition can serve to greatly improve its overall management.

It is the purpose of this article to briefly review these basic principles, and to provide a rational approach to elderly incontinent patients. Directions for future research will be suggested that could lead to even better understanding and approaches to the management of this condition.

Defining the Problem

Prevalence

Studies in Great Britain and Europe have found the prevalence of urinary incontinence in older

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patients in hospitals to be between 18 percent¹ and 40 percent² in men, and 24 percent³ and 46 percent² in women. In elderly persons living in the community the prevalence has ranged from 5 percent⁴ to 25 percent⁵ in men, and from 7 percent⁴ to 42 percent⁵ in women. In the United States, between 28 percent⁶ and 50 percent⁷ of the elderly in nursing homes are incontinent.

There are several reasons these prevalence figures are so varied—including whether the study was done in the community or institutions, the timing of the study in relation to acute illness, and how the investigators defined incontinence and asked about the problem.

Because urinary incontinence is such a heterogeneous condition, a precise definition is important for studying the problem systematically. It is probably best to define incontinence in a general way (such as “any uncontrolled leakage of urine at any time”) and to develop a classification based on its severity, using the number of incontinent episodes per day, or even measuring the amount of urine by weighing soiled underclothes.⁸

In a recent British survey, which more precisely defined incontinence and included older persons in the community as well as in institutions, 11 percent of men and 17 percent of women were found to have some problem with urinary incontinence.⁹

Whatever the precise prevalence, it is clear that millions of elderly persons throughout the world are afflicted with this condition, and many more probably suffer with it while failing to admit its presence.

Factors Associated With Incontinence

There is very little information characterizing those with this disorder. Factors that may have important implications for prevention, prognosis and management remain to be defined.

A relation between urinary incontinence and cognitive impairment has been recognized in a few studies,^{2,9} but this was in older patients in institutions, where the prevalence of cognitive impairment approaches 50 percent; the importance of this information alone is therefore uncertain. Most of the elderly seen at one outpatient incontinence clinic in Great Britain did not have substantial cognitive impairment and also could walk without assistance,¹⁰ but the important relationship between these characteristics and the severity of the incontinence was not described.

One important factor associated with incon-

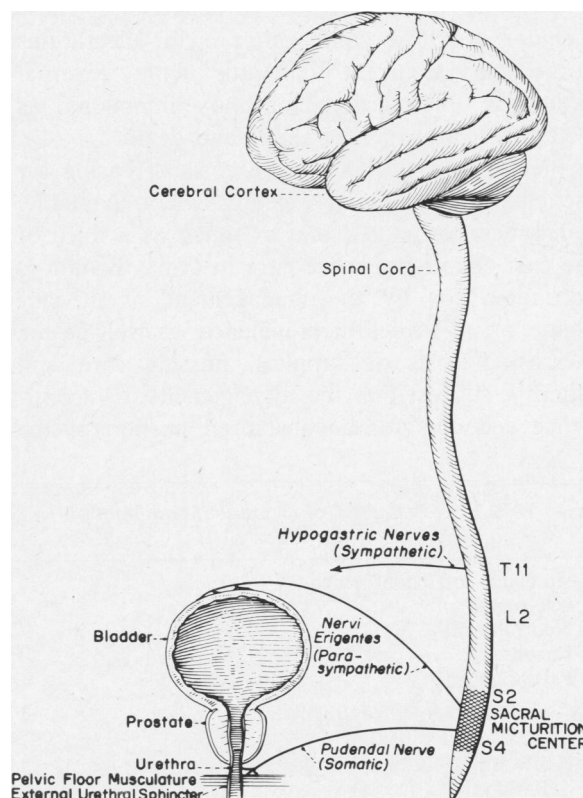


Figure 1.—The structural components of normal micturition.

tinence in the elderly is acute illness. Previously continent older persons often become incontinent when admitted to hospital for a variety of acute conditions.¹¹ This relationship may explain the transience of urinary incontinence in up to a third of such persons in some studies.^{9,11}

The relationship between acute illness and incontinence is important because appropriate management of the incontinence during this period of acute illness may prevent a transient problem from becoming established, with attendant complications.

Complications of Incontinence

There are a myriad of medical, psychosocial and economic complications of urinary incontinence.

Those in whom this problem develops tend to withdraw from social activities, become isolated and frequently depressed. Their families and friends often have more difficulty dealing with incontinence than any other caretaker function. For these reasons, incontinence is a major factor predisposing the elderly to institutional admission.

Once present, incontinence and its management

give rise to several medical complications. These include decubitus and other skin ulcerations (especially recurrent balanitis from external catheters) and recurrent urinary infections, as well as a higher risk for sepsis and death.

Precise information on the costs of caring for the elderly incontinent persons is not available. It has been estimated that as much as a third of the cost of nursing home care in Great Britain is accounted for by the management of incontinence.¹² Similarities in prevalence, as well as the increasing costs of supplies, nursing care and laundry, suggest that the management of incontinence accounts for a substantial portion of the

\$18 billion a year spent on nursing home care in this country.*

Causes of Urinary Incontinence in the Elderly

Normal Micturition

It is important to briefly review the basic anatomy and physiology of micturition to understand the pathophysiology of incontinence.

Micturition is a complex, dynamic process that involves the coordination of several components. Figure 1 depicts the structures that are involved in the process of micturition.

Micturition is basically controlled by the sacral micturition center (S2-4) of the spinal cord. This center receives sensory input from the bladder and surrounding structures, and sends motor input to the bladder via the nervi erigentes (parasympathetic, cholinergic) and to the urethral sphincter via the pudendal nerve (somatic). These structures also receive sympathetic input from the hypogastric plexus; α -adrenergic stimulation contracts the external sphincter, and β -adrenergic stimulation relaxes the bladder as it fills, and relaxes the bladder outlet during micturition.

The sacral micturition center is under the influence (predominantly inhibitory) of the central nervous system. Normally the pressure in the bladder remains low (less than 20 cm of water) as the bladder fills, as depicted in Figure 2. Normal bladder capacity is between 350 and 550 ml, and the first urge to void is normally felt between 150 and 250 ml. The urge to void is inhibited by the central nervous system until voluntary micturition is initiated by cholinergically mediated stimulation of the detrusor muscle via the nervi erigentes. Normal micturition requires the coordinated relaxation of the bladder outlet and urethra.

Other structures important in micturition, such as the prostate in men and the pelvic floor musculature in women, are shown in Figure 1.

Disorders of micturition in the elderly can result from disruption of any of these components of normal micturition.

Causes of Incontinence

Table 1 lists the causes of urinary incontinence in the elderly. As is the case with much of the illness seen in the elderly, the causes are often multiple, and interact with each other in complex ways.

It is useful to distinguish between the causes of

TABLE 1.—*Causes of Urinary Incontinence in the Elderly*

Basic causes of incontinence
Urological
Neurological
Locomotor
Psychological
Cause of transient incontinence
Urinary tract infection
Acute illness—especially when accompanied by:
Fatigue
Immobilization
Hospital admission and environmental barriers
Confusion
Other acute confusional disorders
Retention with overflow incontinence
Fecal impaction
Anticholinergic drugs
Spinal cord compression
Drugs
With effects on the autonomic nervous system
Sedatives and tranquilizers
Psychological
Depression with regression and dependency
Hostility
Causes of established incontinence
Previous surgical operation
With damage to sphincters or pelvic innervation
Diseases of the cerebral cortex
Stroke
Dementia
Parkinson's disease
Diseases of the spinal cord
Compression by tumor, spondylosis, herniated disc
Trauma
Demyelination
Retention with overflow
Atonic bladder due to diabetes, alcoholism
Prostatic obstruction
Urethral stricture
Diseases of the bladder
Chronic cystitis
Carcinoma
Calculi
Uninhibited bladder
Stress incontinence

*Elsewhere in this issue is the article "A Guide Through the Maze of Long-term Care," which bears on this subject.

TABLE 2.—Types of Established Incontinence

Types of Incontinence	Manifestations	Common Causes
Stress	Leakage of small amounts of urine with increases in intraabdominal pressure	Prolapse of pelvic structures in women Sphincter damage Uninhibited bladder contractions may be involved
Urge	Leakage of urine due to inability to delay voiding long enough to reach toilet after urge to void is perceived	Uninhibited bladder contractions—associated especially with central nervous system disease such as stroke, dementia, Parkinson's disease, multiple sclerosis, prostatic obstruction, postprostatectomy
Overflow	Leakage of small amounts of urine without urge to void or ability to void normal volumes	Anatomic obstruction (prostate, urethral stricture) Hypotonic bladder (diabetes, syphilis, spinal cord compression) Anticholinergic drugs
Total	Complete lack of control over voiding	Sphincter damage Nerve damage (peripheral or spinal cord injury) Dementia (severe)*

*Incontinence may initially be nocturnal or intermittent but often becomes constant as cognitive impairment worsens.

transient versus *established* incontinence because the pathophysiology, prognosis and implications for management are different in these two groups.

Transient Incontinence. Transient incontinence is most often associated with acute medical conditions, psychologic responses or iatrogenic factors; appropriate management can often prevent these episodes of incontinence from becoming an established problem.

Acute urinary tract infections frequently precipitate incontinence. It should be noted that the relationship of chronic bacteriuria and pyuria in older persons to incontinence is not clear.^{13,14} Any elderly patient who is incontinent and has pyuria and bacteriuria should be treated for the infection; if the infection is irradiated and incontinence persists, then further evaluation is indicated (see below).

Any acute illness that is associated with fatigue, immobilization, confusion and hospital admission can precipitate incontinence. This is especially true of elderly persons who, upon becoming ill and entering a hospital, lose the adaptive mechanisms they have developed at home to cope with urinary frequency and urgency. Appropriate supportive management with attention to the environment, such as making toilet substitutes accessible, is crucial in preventing perpetuation of the incontinence. Many attitudes and behaviors of hospital staffs may contribute to the development and persistence of this type of transient incontinence.¹¹

Drugs are another important iatrogenic factor that can contribute to incontinence. Because of the importance of the autonomic nervous system to normal micturition, drugs that affect this system can contribute to the development of inconti-

nence. This is especially true of anticholinergic drugs, which can cause urinary retention and overflow incontinence. Sedatives and hypnotics, which diminish the recognition of cues for normal micturition, can also be a factor in the development of urinary incontinence.

Overflow incontinence caused by urinary retention is important to recognize because it is reversible, and can itself lead to complications such as hydronephrosis and postobstructive diuresis. In addition to drugs, fecal impaction and acute spinal cord compression are other reversible causes of this type of incontinence.

Psychological factors can be important in precipitating and perpetuating urinary incontinence. Incontinence can help fulfill the needs for dependency and secondary gain of those who are depressed. It is also a convenient way to express anger and hostility. Attention to these psychological factors is important in managing both transient and established incontinence.¹¹

Established Incontinence. Table 2 defines different types of established incontinence that can be seen in the elderly.

The causes of established incontinence listed in Table 1 are relatively straightforward. Two of these deserve further mention because they are extremely common: *stress urinary incontinence* in women and the *uninhibited bladder* in both men and women.

Stress Urinary Incontinence. Leakage of urine during exercise, coughing, sneezing, laughing and the like can be extremely distressing for elderly women. This condition is most often caused by an anatomical abnormality—hypermobility of the proximal urethra that results in a position outside

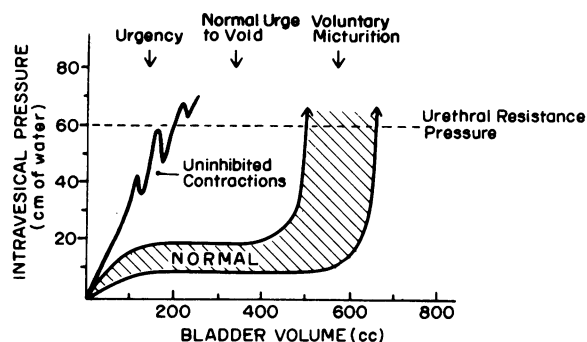


Figure 2.—Pressure-volume curves depicting the normal relationship and uninhibited bladder contractions.

TABLE 3.—Basic Evaluation of Urinary Incontinence in the Elderly

History Physical examination Analysis and culture of urine Postvoid residual determination	
Men	Women
Urine flowmetry	Voiding cystourethrogram
Cystoscopy	Cystoscopy
Cystometrics	Cystometrics
Other urologic studies as indicated*	

*Urethral pressure profile, sphincter electromyography (see text for details).

the intra-abdominal cavity. This allows intra-abdominal pressure to contribute to leakage of urine, rather than continence as it does when the proximal urethra is intra-abdominal.¹⁵ Multiparous, postmenopausal women with weakened pelvic floor musculature are most susceptible to this condition.

Many women with stress incontinence have uninhibited bladder contractions¹⁵ (see below), but the relation of these contractions to the causes and management of this condition is unclear.^{15,16}

Uninhibited Bladder. The terms uninhibited neurogenic bladder, detrusor hyperreflexia and unstable bladder have all been used to describe urinary symptoms associated with uninhibited bladder contractions. These contractions often occur at low bladder volumes—and when bladder pressure exceeds urethral resistance, leakage of urine can occur (see Figure 2).

Between 50 percent and 75 percent of elderly incontinent persons will have uninhibited contractions on cystometric testing.¹⁷⁻¹⁹ They also occur in 20 percent or more of women with stress incontinence,¹⁵ and in up to 50 percent of men with postprostatectomy incontinence.^{20,21}

It is important to recognize that this urodynamic finding may result from a wide range of genitourinary, as well as neurological, disorders.²² In addition, the specificity of these uninhibited contractions for urologic or neurologic pathological conditions in the elderly has not been established because the prevalence of this finding in healthy continent elderly persons is not known.^{18,23}

Uninhibited bladder contractions are often held responsible for the common complaints of urinary frequency and urgency in the elderly. When combined with locomotor disturbances, these contractions certainly could be responsible for the urge incontinence so common in this population. It is on this basis that anticholinergic drugs, which inhibit bladder contractions, are used to treat urge incontinence (see below).

Diagnostic Approach

In his "Treatise on the Decline of Life" (1853) Van Oven said of urinary incontinence in the elderly, "This is a most miserable Condition, and after it has been long existing, is often irremediable."

Over a century later the attitude that urinary incontinence is part of the decline in life, and that it is often incurable, too frequently becomes a self-fulfilling prophecy.

The first and most important step in approaching urinary incontinence in the elderly is to recognize it as a problem worthy of thorough diagnostic evaluation. A basic scheme for evaluating the disorder is shown in Table 3. The importance of searching for reversible causes of transient incontinence (shown in Table 1) throughout the evaluation should be emphasized.

History

A detailed history, obtained from either the patient or someone who knows the patient well, is important in defining the nature and extent of the problem. Although no particular set of symptoms is specific for any type of incontinence, a history of surgical operation, urinary infection or drug ingestion, as well as urgency, dysuria, hematuria, hesitation, sensation of bladder fullness, and the frequency, timing and volume of incontinence, can all be important diagnostic information.

Physical Examination

In addition to a careful examination of the genitourinary system, palpation of the abdomen

for a distended bladder is important in diagnosing urinary retention with overflow incontinence. If a distended bladder is found, examination for fecal impaction and neurologic examination to look for signs of spinal cord compression should be done.

Neurologic examination, in addition to identifying signs of cord compression, can be helpful in identifying other pathological conditions that can contribute to incontinence. This would include examinations of rectal sphincter tone, perianal sensation and the bulbocavernosus reflex, as well as sensation and reflexes in the lower extremities.²²

Analysis and Culture of Urine

Because incontinence is often precipitated by urinary infection, routine analysis and culture of urine specimens are important initial studies. Although bacteriuria and pyuria are common in the elderly and often asymptomatic,^{13,14} in the presence of the recent onset of urinary incontinence, an attempt should be made to eradicate any documented infection.

Postvoid Residual Determination

This is a simple yet often overlooked diagnostic test. In addition to yielding important information in itself, the urine obtained can serve as a clean specimen for culture. Residual urine of more than 20 to 30 ml obtained within a few minutes of voiding is abnormal and should prompt an evaluation for conditions such as outflow obstruction or a hypotonic bladder.

Radiological Studies

One of the most frequently ordered tests in evaluating incontinence is an intravenous pyelogram (IVP). Given the small but definite risk of this test (especially in the presence of diseases common in the elderly such as diabetes, chronic renal failure and heart failure)²⁴ and the fact that the same information can be obtained from more sensitive and specific procedures, it is unclear why IVP's are so frequently ordered.

If visualization of the dynamics of micturition is desired, a voiding cystourethrogram, with stress maneuvers when appropriate, should be done. Ultrasonography is safer and just as sensitive as an IVP in excluding hydronephrosis, and cystoscopy is more sensitive and specific than radiographic studies in defining urethral and bladder pathological conditions.

TABLE 4.—*Therapeutic Modalities for Urinary Incontinence in the Elderly*

Supportive measures
Appropriate attitudes
Accessible toilet substitutes
Bedside commodes
Urinals
Absorbent bed pads
Protective undergarments
Toileting routines ("bladder retraining")
Avoidance of iatrogenic complications
Excessive sedation
Inaccessible toilets
Drugs adversely affecting bladder or urethral function
Drugs (See Table 5)
Surgical procedures
For pelvic prolapse in women
For bladder outlet obstruction in men
Mechanical and electrical devices
Artificial sphincters
Electrical stimulators of sphincter musculature
Catheters
External (condom or "Texas")
Suprapubic
Indwelling

Urologic Studies

Many types of urologic studies are available to evaluate incontinence, including cystoscopy, cystometrics, urine flow studies, measurements of urethral pressure (urethral profilometry) and recording of the electrical activity in sphincter muscles (sphincter electromyography).²⁵⁻²⁸ An apparatus designed to simultaneously display voiding cystourethrography and pressure-flow studies has been used in Great Britain to evaluate incontinence.²⁸

The most sensitive and specific urologic procedure for evaluation of incontinence is direct visualization of the urethra and bladder by cystoscopy. Because urinary incontinence, as well as abnormalities on any one of the urodynamic tests, can reflect a variety of underlying disorders, elderly persons in whom there is no well-defined cause of transient incontinence (or whose incontinence has not cleared despite treatment for one of these causes) should have cystoscopy.

The usefulness of urodynamic tests in the evaluation of urinary incontinence in the elderly is controversial.²⁹ As mentioned above, the specificity of these tests is unknown in these patients, and they are invasive, expensive and often technically difficult to perform and interpret in this population. In addition, some studies of drug therapy for incontinence could not find a clear correlation between symptomatic improvement and changes

in some urodynamic tests.³⁰⁻³³ Some investigators feel these tests are crucial for diagnosis and therapy,^{10,19,34} whereas others feel the tests are not needed for many patients who can be diagnosed using an algorithm that is based on history and physical examination findings.^{35,36}

Despite this controversy, urodynamic tests can realize that symptoms do not accurately predict be useful in some patients. It is important to urodynamic abnormalities; this was nicely documented in a study of 15 elderly men with "typical symptoms of prostatic obstruction."²⁹ Half of these men had uninhibited bladder contractions alone, without obstruction shown on urodynamic testing. Urine flowmetry can be a valuable screening test for men with symptoms of outflow obstruction; flow rates of less than 10 ml per second are abnormal, and rates greater than 25 ml per second usually rule out obstruction.²⁵ Cystometrics and other pressure-flow studies can identify uninhibited bladder contractions or sphincter weakness. In the absence of other correctable pathological conditions, abnormalities detected on these types of studies can be used to guide trials of drug therapy for the incontinence³⁷ (see below and Table 5).

Management

Table 4 lists several therapeutic modalities available to treat urinary incontinence. It is unfortunate, yet important to recognize, that none of these has been well-studied in carefully characterized groups of elderly incontinent subjects. This should not, however, imply that these forms of treatment are without value for some elderly incontinent patients.

Supportive Measures

Various types of supportive measures may be especially valuable in managing incontinence in the elderly that is associated with acute illness. Appropriate attitudes and environmental manipulations, such as making toilet substitutes readily available, can be very important.^{11,38} Bladder retraining, mostly in the form of specific toileting routines and symptom monitoring has been advocated for certain patients,³⁹⁻⁴¹ but remains of uncertain value in the elderly. Special absorbent bed pads and undergarments may prove very effective not only in managing the incontinence, but in preventing skin irritation and excessive costs of nursing time and laundry.^{11,42,43}

Drugs

Several different types of drugs have been used to manage incontinence (Table 5). Although many studies of these drugs have included small numbers of elderly patients,^{30,33,44-49} they have important methodologic problems. Despite the difficulties with these studies, it does appear that some drugs will affect the symptoms and, in some instances, the urodynamic abnormalities of elderly incontinent persons.^{30,33,45,49}

Until further studies are done it is reasonable to treat those patients who have established incontinence and uninhibited bladder contractions with an anticholinergic drug—such as oxybutinin (5 mg three times a day), imipramine (25 to 50 mg three times a day) or propantheline (15 to 30 mg three times a day). These drugs may cause bothersome side effects, such as dry mouth and visual difficulty, as well as urinary retention, and must be used carefully. When sphincter weakness is present alone or along uninhibited contractions, a trial of small doses of an α -adrenergic agonist (such as pseudoephedrine, 15 to 30 mg three times a day) might be of value. These drugs must be used carefully in the presence of systemic hypertension and organic heart disease.

Topically administered estrogens have been used to treat urinary symptoms related to atrophic vaginitis. Although they are of theoretic value in the management of stress incontinence, data on their efficacy for this condition are not available. Topical intravaginal estrogens are rapidly absorbed to pharmacologic blood levels; potential complications, as have been described for systemic estrogen therapy for other conditions in the elderly, should therefore be kept in mind⁵⁰ (Table 5).

Surgical Procedures

Several different types of surgical procedures can ameliorate or even cure incontinence that is related to prolapse of pelvic structures in elderly women. These procedures should be considered for those who can tolerate this type of operation.

An operation is clearly indicated for overflow incontinence in men when it is related to anatomical obstruction. The surgical mortality for this type of procedure is extremely low, even in the elderly⁵¹; avoiding a surgical procedure on the basis of age alone, and treating the condition with catheters (which may have a higher morbidity)

does not seem justified. Negative effects of this type of operation, such as the potential for impotence, should be considered when making a decision.

Electrical and Mechanical Devices

Various types of artificial sphincters and electrical stimulators of sphincter muscles have been tried in the management of incontinence.^{11,52} Many require a surgical procedure; others are too difficult for most elderly to manipulate. Until these techniques are further refined, they have limited application in these patients.

Catheters

Although catheters may be required for the management of urinary incontinence in many old persons, these devices are probably used far too frequently—and often as a matter of convenience.

External catheters for men may substantially reduce the risk from indwelling catheters, but are far from problem-free. Local skin irritation and severe balanitis are common complications. Accordingly, their use should be avoided when other types of therapy, such as drugs or toileting routines, might solve the problem.

Indwelling catheters are the major source of

TABLE 5.—*Drugs Used to Treat Urinary Incontinence*

<i>Drugs</i>	<i>Dosages</i>	<i>Mechanisms of Action</i>	<i>Types of Incontinence</i>	<i>Potential Side Effects</i>	
Anticholinergic					
Propantheline	15-30 mg three times a day	Diminish unin- hibited bladder contractions	Urge incontinence with uninhibited bladder contractions	Dry mouth Blurry vision Elevated intraocular pressure Constipation Postural hypotension, cardiac conduction disturbances (imipramine only)	
Imipramine	25-50 mg three times a day				
Oxybutinin	5 mg three times a day		Stress incontinence with uninhibited bladder contractions		
Dicyclomine	10-20 mg three times a day	Increase bladder capacity			
Flavoxate				
Emepronium*				
α-Adrenergic agonists . . .					
Pseudoephedrine	15-30 mg three times a day	Urethral sphincter contraction	Stress incontinence with sphincter weakness	Headache Tachycardia Elevation of blood pressure Imipramine—see above	
Phenylpropanolamine . .	50 mg twice a day				
Imipramine	25-50 mg three times a day				
Cholinergic agonists					
Bethanechol	10-30 mg three to four times a day	Bladder contraction	Overflow incontinence with atonic bladder	Bradycardia, hypotension, bronchoconstriction, gastric acid secretion	
α-Adrenergic antagonists .					
Phenoxybenzyline	20-200 mg four times a day	Urethral sphincter relaxation	Overflow incontinence with hyperactive urethral sphincter	Postural hypotension, nasal stuffiness, pupillary constriction	
Estrogens					
Systemic					
Estrone	0.3-0.625 mg every day	Increase periure- thral blood flow, muscle strength and sphincter tone	Stress incontinence (women)	Endometrial cancer, elevated blood pressure, gallstones, cardiovascular (stroke, embolus, myocardial infarction)	
Estradiol	1-2 mg four times a day				
Topical					
Estrone	1 gram twice per week				
Investigational					
Prostaglandin inhibitors					
Indomethacin	25-100 mg twice a day	Inhibit bladder contractions	Incontinence with uninhibited bladder contractions	Gastric irritation	
Flubiprofen	50 mg three times a day				
Calcium antagonists . .					
Nifepidine	10-20 mg twice a day			Hypotension, reflex tachycardia, drowsi- ness (nifepidine)	
Baclofen	5-10 mg twice a day			Weakness, insomnia, pruritis (baclofen)	

*Not available in the United States; used in Europe.

nosocomial urinary tract infections, which account for 35 percent of all nosocomial infections, and occur in about 2 percent of hospital admissions.^{53,54} Many of these infections remain asymptomatic, but their presence predisposes to symptomatic infection, as well as sepsis and death. Certain factors, such as advanced age, female sex and serious underlying illness, predispose persons with catheters to the development of bacteriuria.⁵⁵ Although antimicrobial therapy may delay the development of bacteriuria,⁵⁵ antibiotic prophylaxis (using irrigation solutions) is not effective in preventing catheter-associated infections.^{54,56} Despite evidence that bacteria migrate from the urethral meatus to cause catheter-induced infection,⁵⁷ vigorous daily meatal care appears to increase, rather than decrease, the risk of catheter-induced bacteriuria.⁵⁸ Routine catheter irrigation and frequent meatal cleansing are also expensive and time-consuming. Unless further research proves them valuable, these techniques should be avoided.

It is clear that indwelling catheters should be used only when no other form of therapy is practical—that is, in elderly patients with intractable incontinence and skin breakdown that can be exacerbated by contact with urine, in those with outflow obstruction that cannot be corrected surgically or in cases of persistent residual urine that predisposes to recurrent symptomatic infections or renal impairment. When indwelling catheters are used, meticulous attention to sterile closed drainage and adherence to other basic guidelines are important in reducing morbidity from these devices.^{54,59}

Directions for Research

Urinary incontinence is one of the many areas of geriatric medicine that is ripe for well-designed clinical research. Several lines of investigation are suggested by the above discussion:

- The development of descriptive data that characterize those elderly who are incontinent. Determination of factors that will help divide this group into subgroups that will have relevance to further research on the causes, prevention, prognosis and management of the condition should be emphasized.

- The development of more refined techniques for the diagnostic evaluation of incontinence in the elderly, with emphasis on the sensitivity and

specificity of urodynamic tests, as well as their value in the management of the condition.

- The development of new and better management techniques. This should include rigorously controlled studies of treatments such as drugs and bladder training routines, as well as the design of new and better technology for managing elderly persons with intractable incontinence. The latter would include improving currently used diapers, and external and indwelling catheters.

REFERENCES

1. Brocklehurst JC: Incontinence in Old People. Livingstone, Edinburgh, 1951
2. Isaacs B, Walkey FA: A survey of incontinence in the elderly. *Geront Clin* 6:367-376, 1964
3. Affleck JW: The chronic sick in hospital; a psychiatric approach. *Lancet* 2:533-537, 1947
4. Sourander LB: Urinary tract infection in the aged—An epidemiological study. *Ann Med Intern Fenn* 55:Suppl 45:1-55, 1966
5. Milne JS, Williamson J, Maule MM, et al: Urinary symptoms in older people. *Mod Geriatr* 2:198-213, 1972
6. United States National Center for Health Statistics: Health in the United States 1976-1977, DHEW Publication No. (HRA) 77-1232. Washington, DC, 1977
7. UC Office of Nursing Home Affairs: Long-Term Care Facility Improvement Study—Introductory Report. Bethesda, MD, Jul 1975
8. Walsh JB, Mills GL: Measurement of urinary loss in elderly incontinent patients—A simple and accurate method. *Lancet* 1:1130-1131, 1981
9. Yarnell JWG, Leger AS: The prevalence, severity, and factors associated with urinary incontinence in a random sample of the elderly. *Age Ageing*, 8:81-85, 1979
10. Castleden CM, Duffin HM, Asher MJ: Clinical and urodynamic studies in 100 elderly incontinent patients. *Br Med J* 282:1103-1105, 1981
11. Willington FL: Incontinence in the Elderly. San Francisco, Academic Press, 1976
12. Butler R: Geriatric medicine. Lecture delivered to the 33rd Annual Meeting of the Gerontological Society of America, San Diego, Nov 1980
13. Brocklehurst JC, Dillane JB, Griffiths L, et al: The prevalence and symptomatology of urinary infection in an aged population. *Gerontol Clin* 10:242-253, 1968
14. Akhtar AJ, Andrews GR, Caird FI, et al: Urinary tract infection in the elderly: A population study. *Age Ageing* 1:48-54, 1972
15. McGuire EJ, Lytton B, Pepe V, et al: Stress urinary incontinence. *Obstet Gynecol* 47:255-264, 1976
16. Arnold EP, Webster JR, Loose H, et al: Urodynamics of female incontinence: Factors influencing the results of surgery. *Am J Obstet Gynecol* 117:805-813, 1973
17. Brocklehurst JC, Dillane JB: Studies of the female bladder in old age—II. Cystometrograms in 100 incontinent women. *Gerontol Clin* 8:306-319, 1966
18. James MH: Disorders of micturition in the elderly. *Age Ageing* 8:285-288, 1979
19. Overstall PW, Rounce K, Palmer JH: Experience with an incontinence clinic. *J Am Geriatr Soc* 28:535-538, 1980
20. Schoenberg HW, Gutrick JM, Cote R: Urodynamic studies in benign prostatic hypertrophy. *Urology* 14:634-637, 1979
21. Fitzpatrick JM, Gardiner RA, Worth PHL: The evaluation of 68 patients with post-prostatectomy incontinence. *Br J Urol* 51:552-555, 1979
22. Raz S, Bradley WE: Neuromuscular dysfunction of the lower urinary tract, chap 35, *In* Campbell J (Ed): *Urology*, 4th Ed. Philadelphia, WB Saunders, 1979, pp 1215-1269
23. Brocklehurst JC, Dillane JB: Studies of the female bladder in old age—I. Cystometrograms in non-incontinent women. *Gerontol Clin* 8:285-305, 1966
24. Carvallo A, Rakowski TA, Argy WP, et al: Acute renal failure following drip infusion pyelography. *Am J Med* 65:38-45, 1978
25. Pearson RM, Noe HN: Why urodynamic studies are important in urologic problems of the elderly. *Geriatrics* 43-53, Jan 1979
26. Abrams P, Torrens M: Urine flow studies and cystometry. *Urol Clin North Am* 6:71-85, Feb 1979
27. McGuire E: Electromyographic evaluation of sphincter function and dysfunction. *Urol Clin North Am* 6:121-124, Feb 1979

28. Whiteside G, Bates P: Micturating cystography and synchronous video pressure-flow cystourethrography. *Urol Clin North Am* 6:89-102, Feb 1979
29. Eastwood HDH: Urodynamic studies in the management of urinary incontinence in the elderly. *Age Ageing* 8:41-48, 1979
30. Brocklehurst JC, Dillane JB: Studies of the female bladder in old age—IV. Drug effects in urinary incontinence. *Gerontol Clin* 9:182-191, 1967
31. Hebjorn S: Treatment of detrusor hyperreflexia in multiple sclerosis. *Urol Int* 32:209-217, 1977
32. Ek A, Anderson KE, Gullberg B, et al: The effects of long-term treatment with norephedrine on stress incontinence and urethral pressure profile. *Scand J Urol Nephrol* 12:105-110, 1978
33. Moisey CV, Stephenson TP, Brenoler CB: The urodynamic and subjective results of treatment of detrusor instability with oxybutinin chloride. *Br J Urol* 52:472-475, 1980
34. Castleden CM, Duffin HM: Assessing elderly incontinent patients (Letter). *Br Med J* 282:1707, 1981
35. Hilton P, Stanton SL: Algorithmic method of assessing urinary incontinence in elderly women. *Br Med J* 282:940-942, 1981
36. Hilton P, Stanton SL: Assessing elderly incontinent patients (Letter). *Br Med J* 282:1706, 1981
37. Khanna OP: Disorders of micturition. *Neuropharmacologic basis and results of drug therapy. Urology* 8:316-328, 1976
38. Wells T, Brink C: Promoting urine control in older adults—Helpful equipment. *Geriatr Nurs* 1:264-269, Nov-Dec 1980
39. Mauey JY: A behavioral approach to bladder retraining. *Nurs Clin North Am* 11:179-188, 1976
40. Marks RL, Bahr GA: How to manage neurogenic bladder after stroke. *Geriatrics* 50-54, Dec 1977
41. Frewen W: Role of bladder training in the female. *Urol Clin North Am* 6:273-275, 1979
42. Silberberg FG: A hospital study of a new absorbent bed pad for incontinent patients. *Med J Aust* 1:582-586, 1977
43. Beber CR: Freedom for the incontinent. *Am J Nurs* 80:483-484, Mar 1980
44. Brocklehurst JC, Armetage P, Jouhar AJ: Emepromium bromide in urinary incontinence. *Age Ageing* 1:152-157, 1972
45. Awad SA, Bryniak S, Downie JW, et al: The treatment of the uninhibited bladder with dicyclomine. *J Urol* 117:161-163, 1977
46. Ritch AES, George CF, Castleden CM, et al: A second look at emepromium bromide in urinary incontinence. *Lancet* 1:504-506, 1977
47. Briggs RS, Castleden CM, Asher MJ: The effect of flavoxate on uninhibited detrusor contractions and urinary incontinence in the elderly. *J Urol* 123:665-666, 1980
48. Williams AJ, Prematalake JKTG, Palmer RL: A trial of emepromium bromide for the treatment of urinary incontinence in the elderly mentally ill. *Pharmatherapeutics* 2:539-542, 1981
49. Castleden CM, George CF, Renwick AG, et al: Imipramine—A possible alternative to current therapy for urinary incontinence in the elderly. *J Urol* 125:318-320, 1981
50. Notelovitz M: When and how to use estrogen therapy in women over 60. *Geriatrics* 35:113-124, Apr 1980
51. Ziffren S: Comparison of mortality rates for various surgical operations according to age groups, 1951-1977. *J Am Geriatr Soc* 27:433-438, 1979
52. Scott FB: The artificial sphincter in the management of incontinence in the male. *Urol Clin North Am* 5:375-391, 1978
53. Turck M, Stamm W: Nosocomial infection of the urinary tract. *Am J Med* 70:651-654, 1981
54. Warren JW, Muncie HL, Berquist EJ, et al: Sequelae and management of urinary infection in the patient requiring chronic catheterization. *J Urol* 125:1-8, 1981
55. Garibaldi RA, Burke JP, Dickman ML, et al: Factors predisposing to bacteriuria during indwelling urethral catheterization. *N Engl J Med* 291:215-219, 1974
56. Warren JW, Platt R, Thomas RJ, et al: Antibiotic irrigation and catheter-associated urinary tract infections. *N Engl J Med* 299:570-573, 1978
57. Garibaldi RA, Burke JP, Britt MR, et al: Meatal colonization and catheter-associated bacteriuria. *N Engl J Med* 303:316-318, 1980
58. Burke JP, Garibaldi RA, Britt MR, et al: Prevention of catheter-associated urinary tract infections—Efficacy of daily meatal care regimens. *Am J Med* 70:655-658, 1981
59. Stamm WE: Guidelines for prevention of catheter-associated urinary tract infections. *Ann Intern Med* 82:386-390, 1975